



Biological_control_in_nature

Demetra Prophetou-Athanasiadou

Professor

Faculty of Agriculture

Aristotle University of Thessaloniki

GREECE

tel 00302310 998843

Lady Beetles in Biological Control: Implications of Life History





Talk components

- 1) **History of coccinellids
in classical biological control**
**From the “lady beetle fantasy”
period to the present**
- 2) **Current use of coccinellids**
Habitats and target prey
- 3) **Mechanisms of success**
Why certain successes?



2. Current use of coccinellids in Biocontrol

Habitats and target prey



Family Coccinellidae

Subfamily Sticholotidinae

Microweisini

Serangiini

Cephaloscymnini

Subfamily Scymninae

Zilini

Stethorini

Scymnini

Selvadiini

Hyperaspini

Cryptognathini

Subfamily Chilocorinae

Chilocorini

Subfamily Coccidulinae

Coccidulini

Noviini

Exoplectrini

Azyini

Subfamily Coccinellinae

Coccinellini

Psylloborini

Subfamily Epilachninae

Epilachnini

Gordon 1985



Hemiptera: Sternorrhyncha

Superfamily Psylloidea

Psyllidae

Superfamily Aleyrodoidea

Aleyrodidae

Superfamily Aphidoidea

Aphididae

Eriosomatidae

Adelgidae

Phylloxeridae

Superfamily Coccoidea

Margarodidae

Ortheziidae

Kerridae

Coccidae

Aclerdidae

Cryptococcidae

Kermesidae

Asterolecaniidae

Lecanodiaspididae

Cerococcidae

Dactylopiidae

Diaspididae

Conchaspidae

Phoenicococcidae

Pseudococcidae

Eriococcidae



Family Coccinellidae

Subfamily Sticholotidinae

Microweisini

Serangiini

Cephaloscymnini

Subfamily Scymninae

Zilini

Stethorini

Scymnini

Selvadiini

Hyperaspini

Cryptognathini

Subfamily Chilocorinae

Chilocorini

Subfamily Coccidulinae

Coccidulini

Noviini

Exoplectrini

Azyini

Subfamily Coccinellinae

Coccinellini

Psylloborini

Subfamily Epilachninae

Epilachnini

Scale

Aphids

Other



Myzus persicae
Aphidoidea: Aphididae



Coleomegilla maculata
Coccinellinae: Coccinellini



Coleomegilla maculata
(Coleoptera: Coccinellidae)



Coleomegilla maculata

- **Gen: 2-5 per year**
- **Ovi: Eggs in clusters near prey**
- **Prey: Aphids, pollen, eggs**
- **BC: Native, commercially available**



Hippodamia convergens
Coccinellinae: Coccinellini



Hippodamia convergens

- **Gen: 1-2 per year**
- **Ovi: Eggs in clusters 15-20**
- **Prey: Aphids**
- **BC: Native, commercially available**



Coccinella septempunctata
Coccinellinae: Coccinellini



Coccinella septempunctata

- **Gen: 1-2 a year**
- **Ovi: Clusters, up to 50**
- **Prey: Aphids, greenbug**
- **BC: Introduced from Europe,
established by accidental
introductions, widely distributed**



Harmonia axyridis
Coccinellinae: Coccinellini



Harmonia axyridis

- **Gen: 2-3 a year**
- **Ovi: Clusters ~20**
- **Prey: Aphids, scale insects, psyllids**
- **BC: Introduced from Asia, now widely distributed**



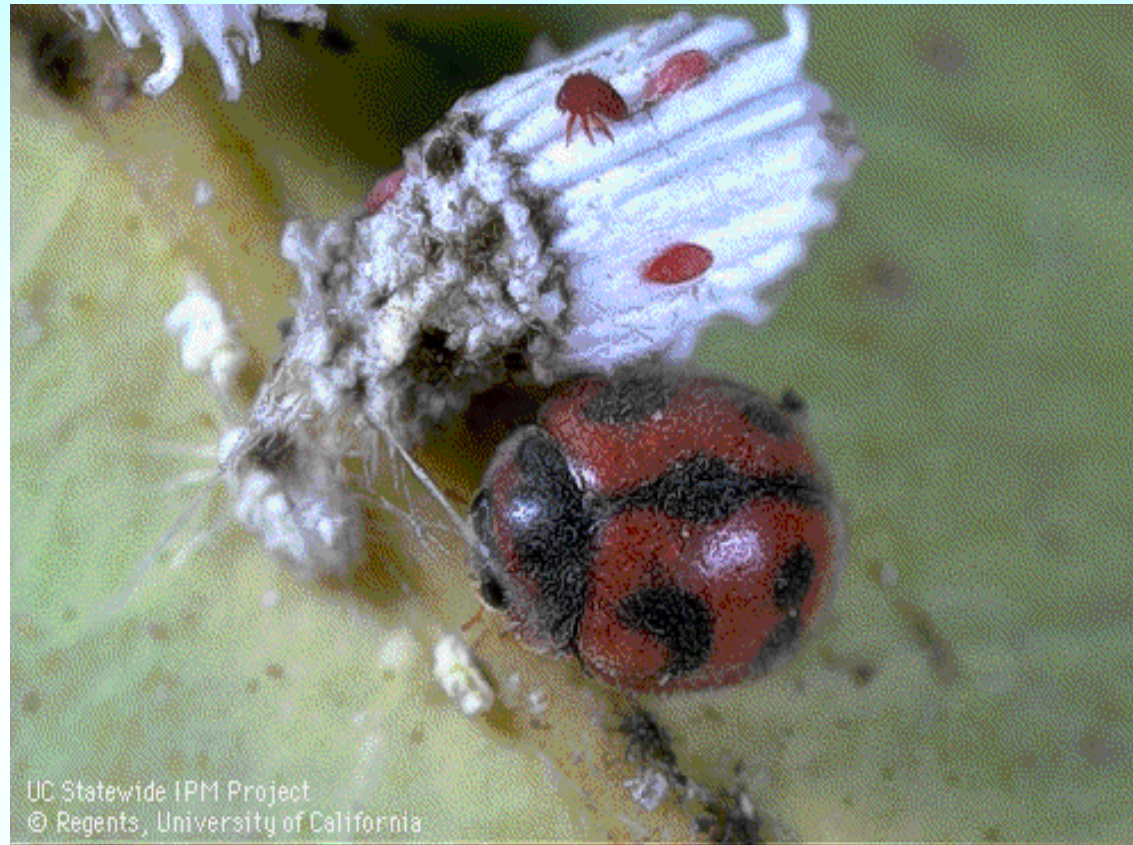
Planococcus citri
Coccoidea: Pseudococcidae



UC Statewide IPM Project
© Regents, University of California

Coccus hesperidum

Coccoidea: Coccidae



Rodolia cardinalis
Coccidulinae: Noviini



Rodolia cardinalis

- **Gen: 8-12 a year**
- **Ovi: Singly under scale covers**
- **Prey: Cottony cushion scale**
- **BC: Introduced from Australia**
Critical for history of biocontrol



UC Statewide IPM Project
© Regents, University of California

Cryptolaemus montrouzieri

Scymninae: Scymnini



Cryptolaemus montrouzieri

- **Gen: Multiple**
- **Ovi: Singly or small clusters**
- **Prey: Mealybugs**
- **BC: Introduced from Australia, used in citrus and ornamentals**



Rhyzobius lophanthae

Coccidulinae: Coccidulini



Ryzobius lophanthae

- **Gen: Multiple**
- **Ovi: Singly under scale covers**
- **Prey: Red scale, other scale insects**
- **BC: Introduced from Australia**



Chilocorus kuwane

Chilocorinae: Chilocorini



Chilocorus kuwane

- **Gen: ~3 per year**
- **Ovi: eggs singly or small clusters**
- **Prey: Eunonymus scale and others**
- **BC: Introduced from Asia**
Commercially available



UC Statewide IPM Project
© Regents, University of California

Delphastus pusillus **Sticholotidinae: Serangiini**



Delphastus pusillus

- **Gen: Multiple**
- **Ovi: Singly among prey**
- **Prey: Whiteflies**
- **BC: Used in greenhouses, effective at high prey densities**



Stethorus punctum
Scymninae: Stethorini



Stethorus punctum

- **Gen: 3 per year**
- **Ovi: Singly, under infested leaves**
- **Prey: Mites**
- **BC: Commercially available**



APHIS approved BC agents

Family	n	%
Aphelinidae	17	13.5
Phytoseiidae	15	11.9
Braconidae	14	11.1
Coccinellidae	13	10.3
Pteromalidae	10	7.9
Aphididae	7	5.6
Encyrtidae	6	4.8
Ichneumonidae	2	1.6
Other	42	33.3



Commercially available coccinellids

“Suppliers of Beneficial Organisms in North America”

CA EPA

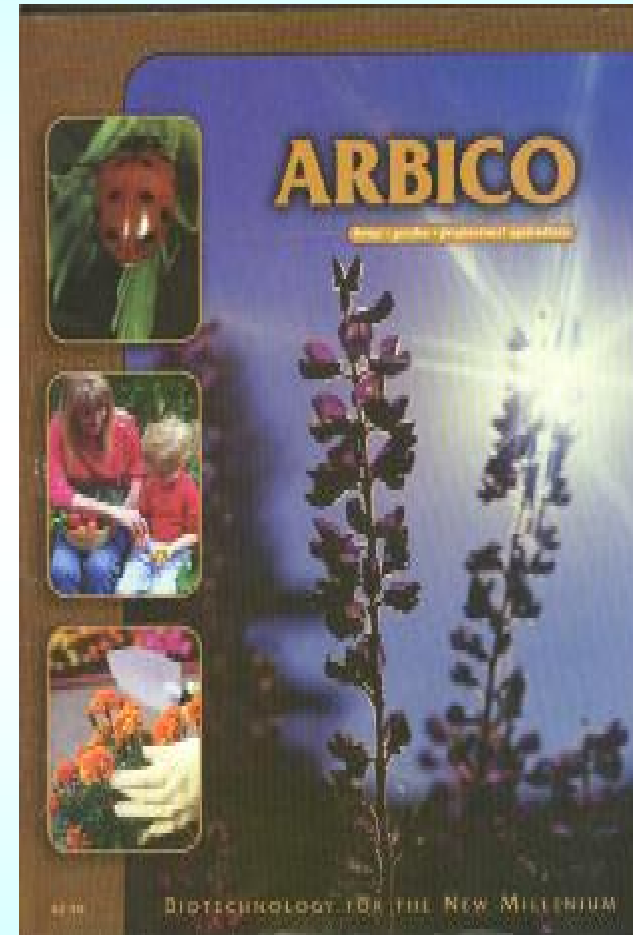


<http://www.cdpr.ca.gov/docs/ipminov/bensuppl.htm>

Many distributors

Mail order catalogs

Order from the web





Hippodamia convergens
Coccinellinae: Coccinellini



Hippodamia convergens **sample prices**

<u>Source</u>	<u>quantity</u>	<u>price</u>
The Green Spot	9,000	18.31
Buglogical	9,000	17.50
Biofac Crop Care	9,000	12.00
Arbico	9,000	15.00
The Bug Store	15,000	35.00
Planet Natural	4,500	9.95



Hippodamia convergens

Objections:

- **Not effective; beetle dispersal**
- **A “black eye” on biocontrol**

IN GREECE

